GROUP 2 HYDRAULIC AND MECHANICAL SYSTEM

1. INTRODUCTION

1) MACHINE IN GENERAL

(1) If even a minor fault is left intact and operation is continued, a fatal failure may be caused, entailing a large sum of expenses and long hours of restoration.
Therefore when even a small trouble occurs, do not rely on your intuition and experience, but look for the cause based on the troubleshooting principle and perform maintenance and adjustment to prevent major failure from occurring. Keep in mind that a fault results from a combination of different causes.

(2) The following lists up commonly occurring faults and possible causes with this machine. For the troubleshooting of the engine, refer to the coming troubleshooting and repair.

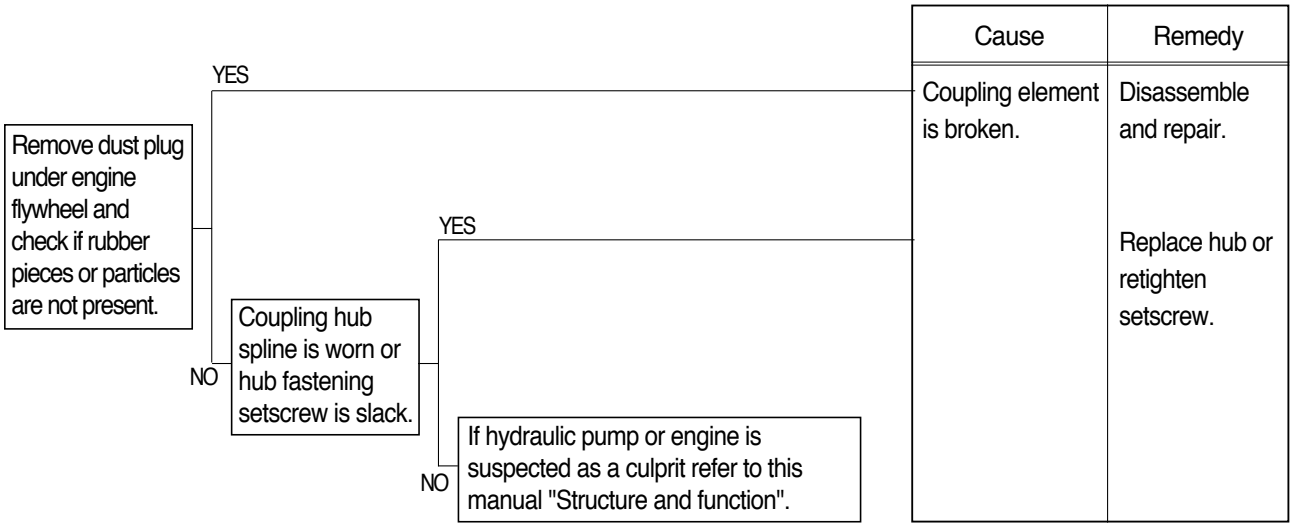
(3) When carrying out troubleshooting, do not hurry to disassemble the components.
It will become impossible to find the cause of the problem.

(4) Ask user or operator the following.
① Was there any strange thing about machine before failure occurred?
② Under what conditions did the failure occur?
③ Have any repairs been carried out before the failure?

(5) Check before troubleshooting.
① Check oil and fuel level.
② Check for any external leakage of oil from components.
③ Check for loose or damage of wiring and connections.

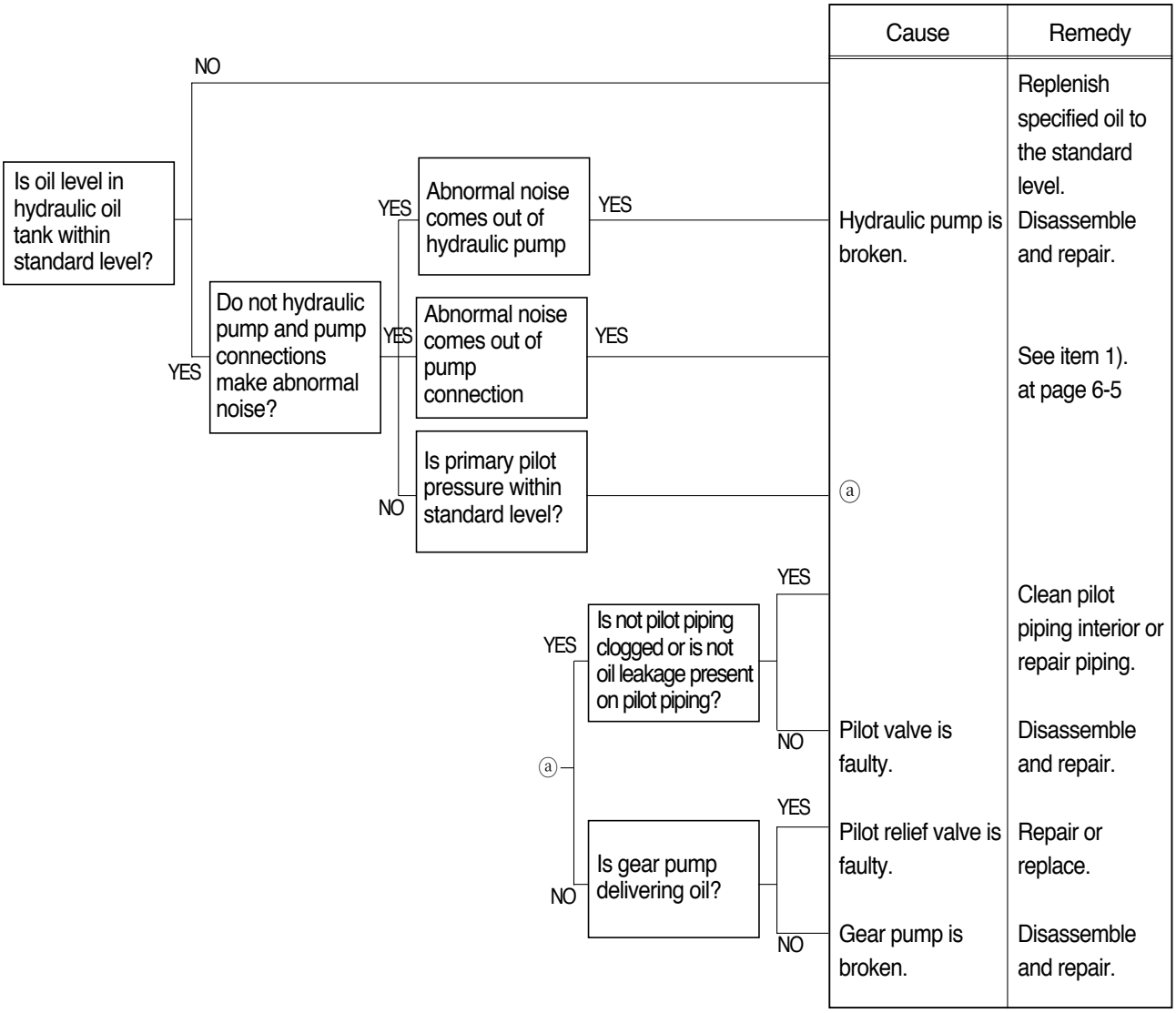
2. DRIVE SYSTEM

1) UNUSUAL NOISE COMES OUT OF PUMP CONNECTION



Cause	Remedy
Coupling element is broken.	Disassemble and repair.
	Replace hub or retighten setscrew.

2) ENGINE STARTS BUT MACHINE DOES NOT OPERATE AT ALL



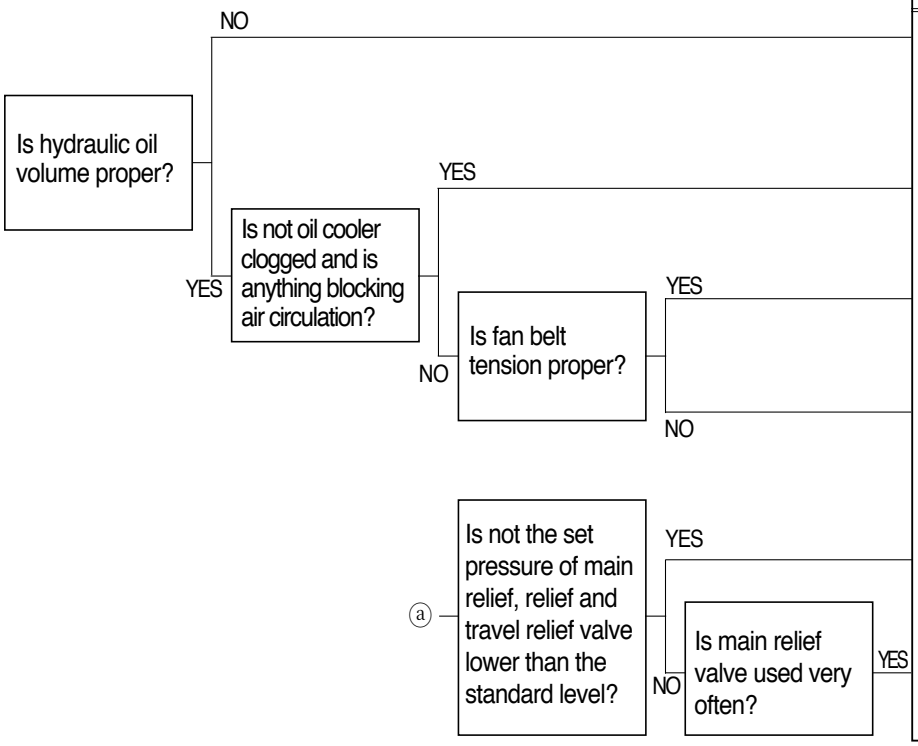
Cause	Remedy
Hydraulic pump is broken.	Disassemble and repair.
ⓐ	See item 1). at page 6-5
Pilot valve is faulty.	Disassemble and repair.
Pilot relief valve is faulty.	Repair or replace.
Gear pump is broken.	Disassemble and repair.

3. HYDRAULIC SYSTEM

1) HYDRAULIC OIL IS CLOUDY

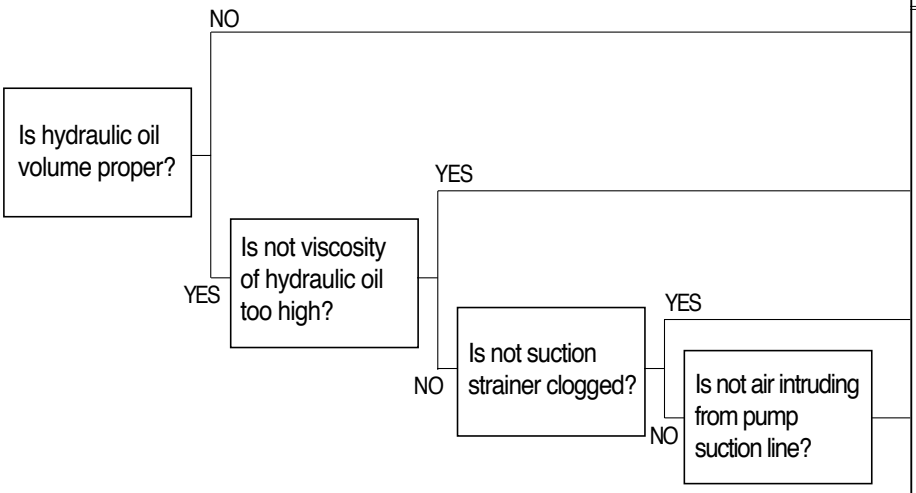
Cause	Remedy
Water is mixed.	Put hydraulic oil still, separate water and dispose it or replace hydraulic oil.
Air is intruded.	Check suction line and return line and eliminate the air intruding source.

2) HYDRAULIC OIL TEMPERATURE HAS RISEN ABNORMALLY



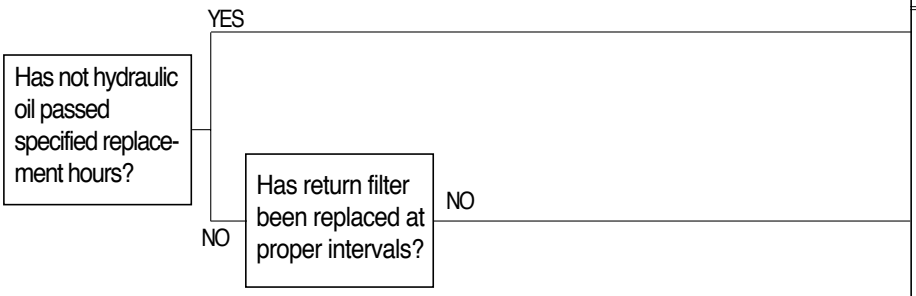
Cause	Remedy
ⓐ	Replenish specified oil to the standard level. Clean oil cooler. Secure air circulation route. Adjust belt tension or replace belt. Readjust set pressure. Reduce load.

3) CAVITATION OCCURS WITH PUMP



Cause	Remedy
	Replenish specified oil to the standard level. Replace oil with one of proper viscosity. Clean suction strainer. Check for air intrusion in suction line and retighten or replace parts.

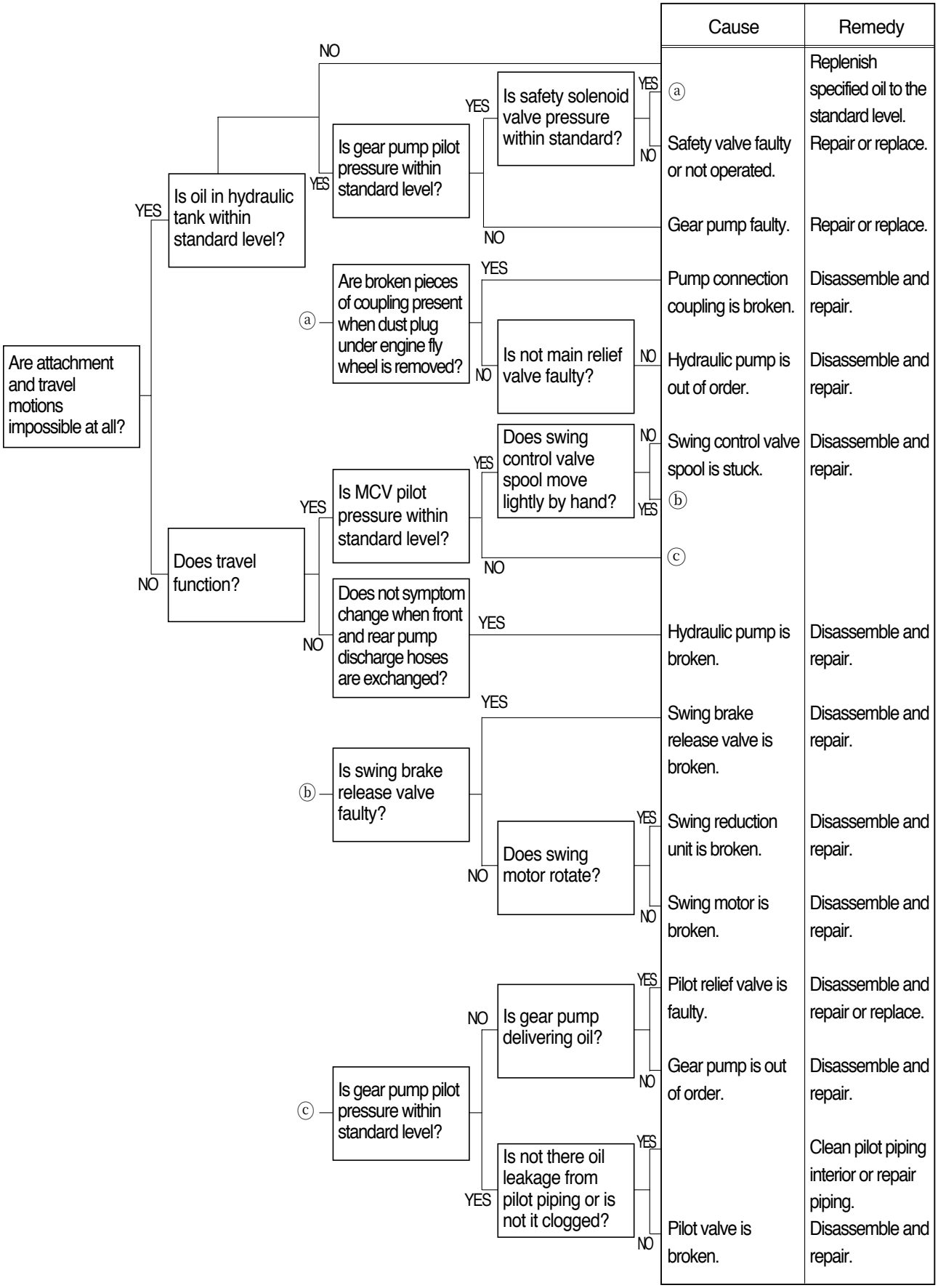
4) HYDRAULIC OIL IS CONTAMINATED



Cause	Remedy
	Replace hydraulic oil to be specified. Flush with hydraulic oil and replace return filter.

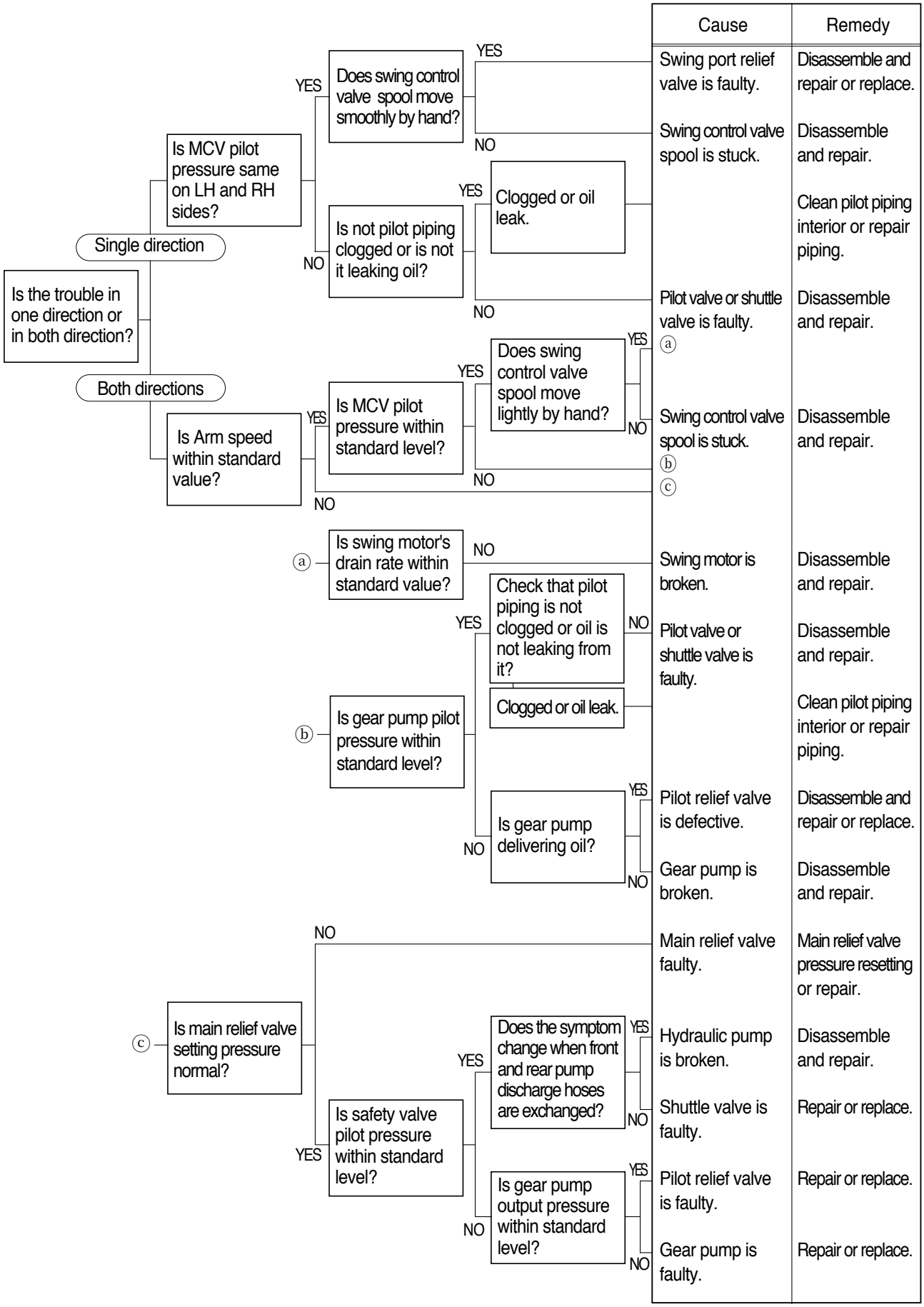
4. SWING SYSTEM

1) BOTH LH AND RH SWING ACTIONS ARE IMPOSSIBLE

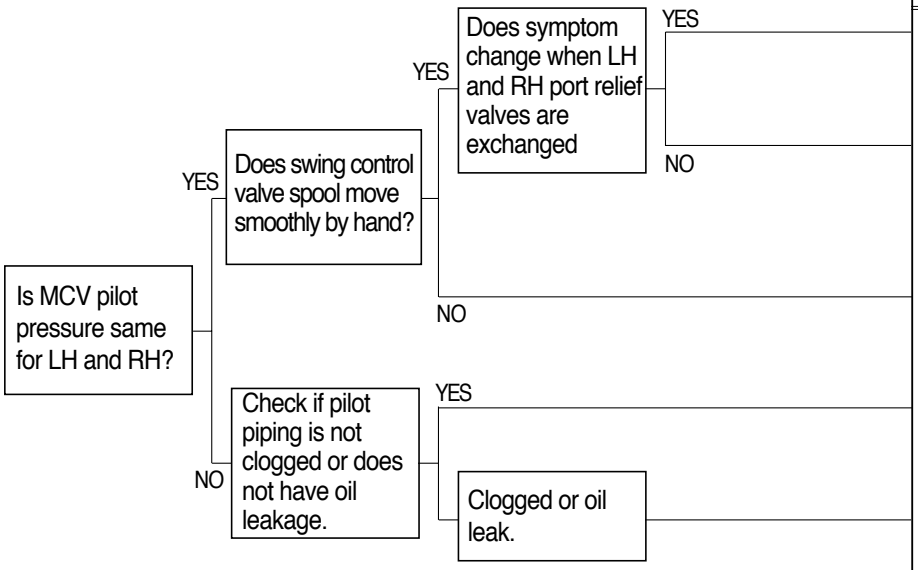


Cause	Remedy
ⓐ Safety valve faulty or not operated.	Replenish specified oil to the standard level. Repair or replace.
Gear pump faulty.	Repair or replace.
Pump connection coupling is broken.	Disassemble and repair.
Hydraulic pump is out of order.	Disassemble and repair.
Swing control valve spool is stuck. ⓑ ⓒ	Disassemble and repair.
Hydraulic pump is broken.	Disassemble and repair.
Swing brake release valve is broken.	Disassemble and repair.
Swing reduction unit is broken.	Disassemble and repair.
Swing motor is broken.	Disassemble and repair.
Pilot relief valve is faulty.	Disassemble and repair or replace.
Gear pump is out of order.	Disassemble and repair.
Pilot valve is broken.	Clean pilot piping interior or repair piping. Disassemble and repair.

2) SWING SPEED IS LOW

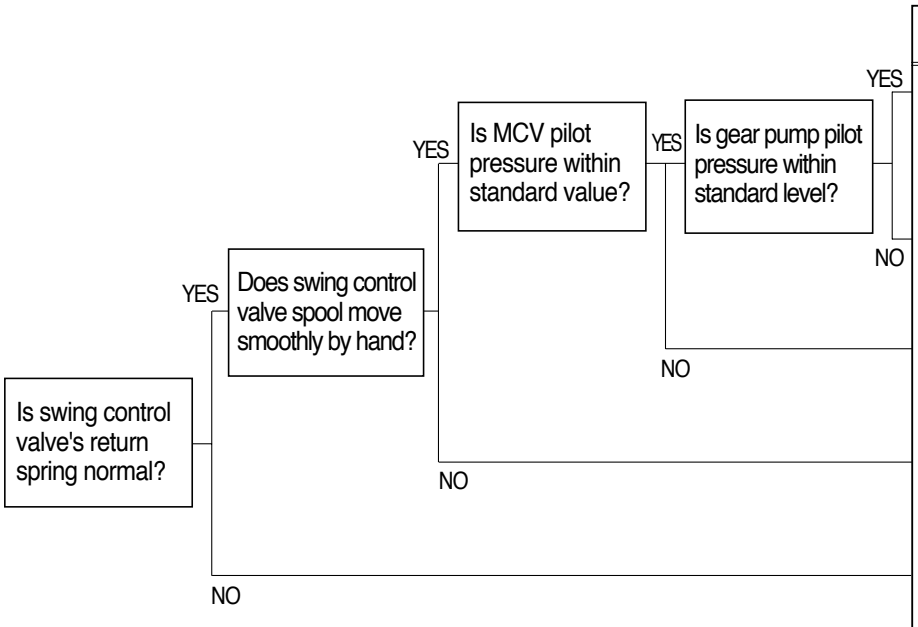


3) SWING MOTION IS IMPOSSIBLE IN ONE DIRECTION



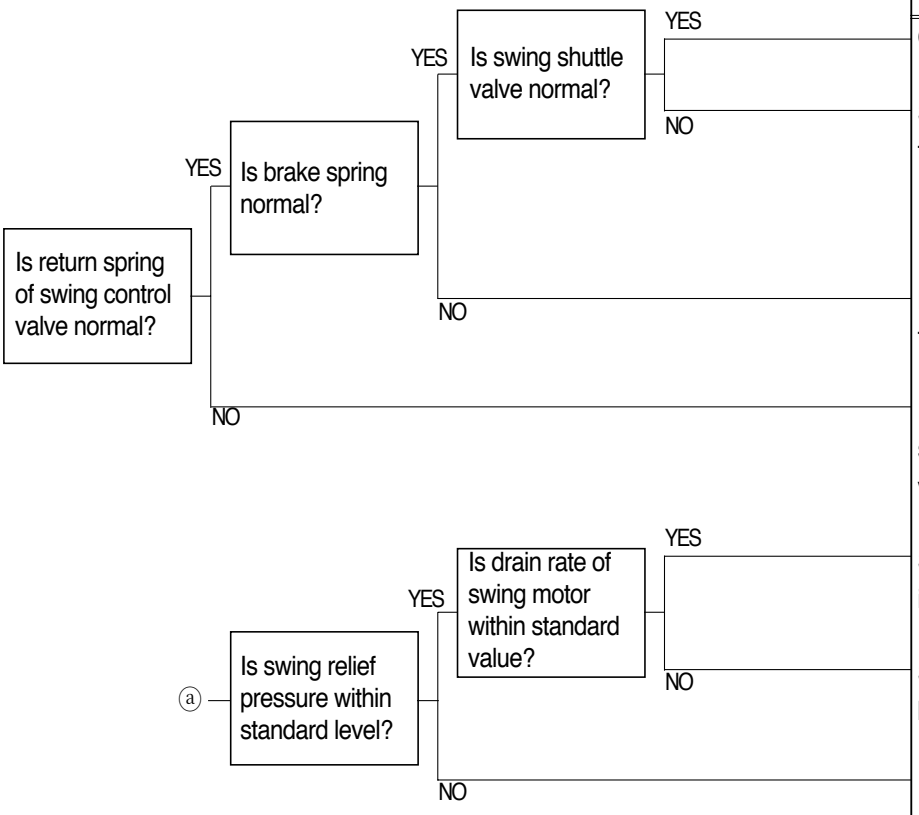
Cause	Remedy
Swing port relief valve is faulty.	Disassemble and repair.
Shuttle valve is faulty.	Disassemble and repair.
Swing control valve spool is stuck.	Disassemble and repair.
Pilot valve is faulty.	Disassemble and repair.
	Clean pilot piping interior or repair piping.

4) MACHINE SWINGS BUT DOES NOT STOP



Cause	Remedy
Pilot relief valve is faulty.	Disassemble and repair or replace.
Gear pump is broken.	Disassemble and repair.
Pilot valve is faulty.	Disassemble and repair.
Swing control valve spool is stuck.	Disassemble and repair.
Return spring is faulty.	Disassemble and replace.

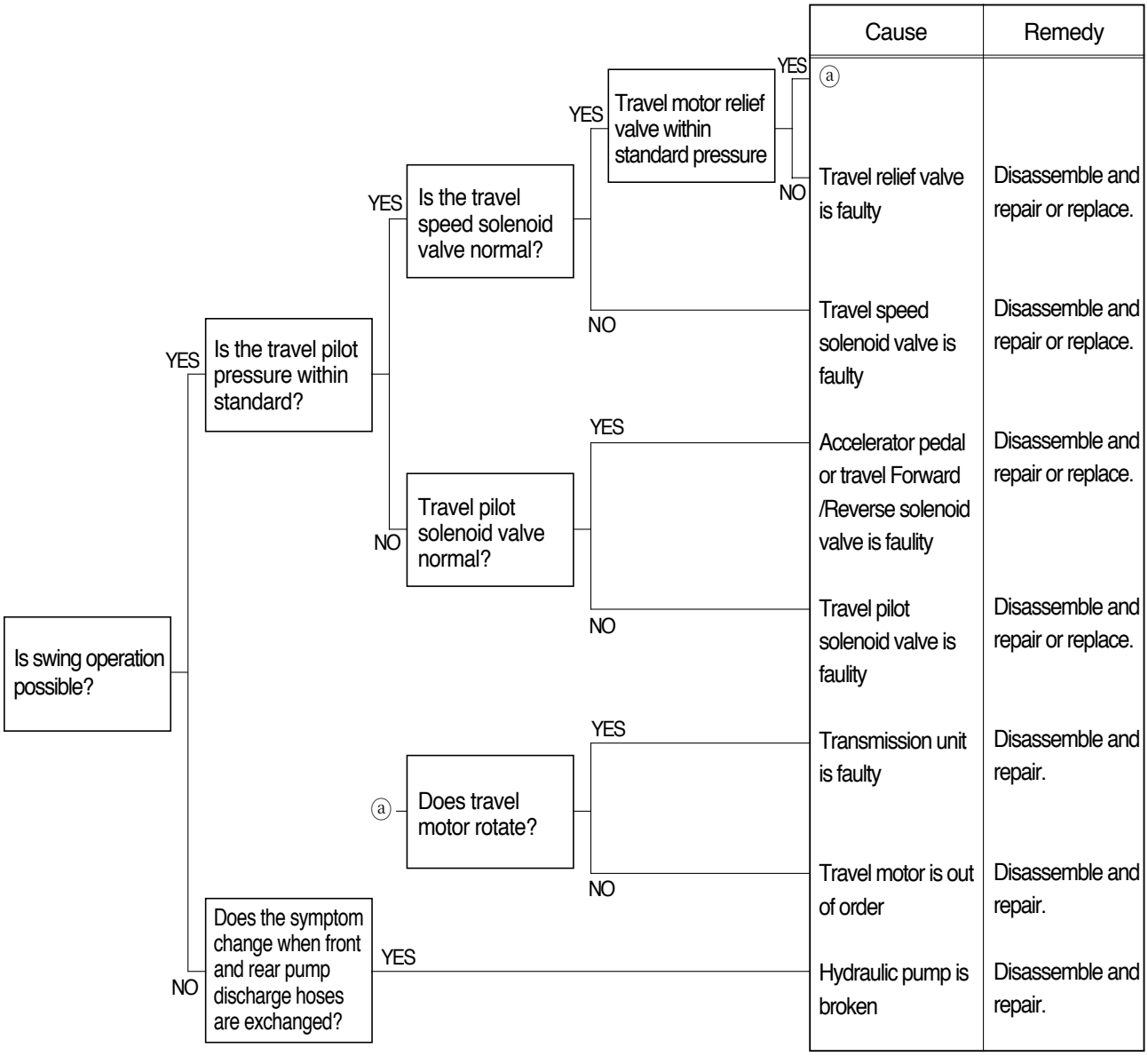
5) THE SWING UNIT DRIFTS WHEN THE MACHINE IS AT REST ON A SLOPE



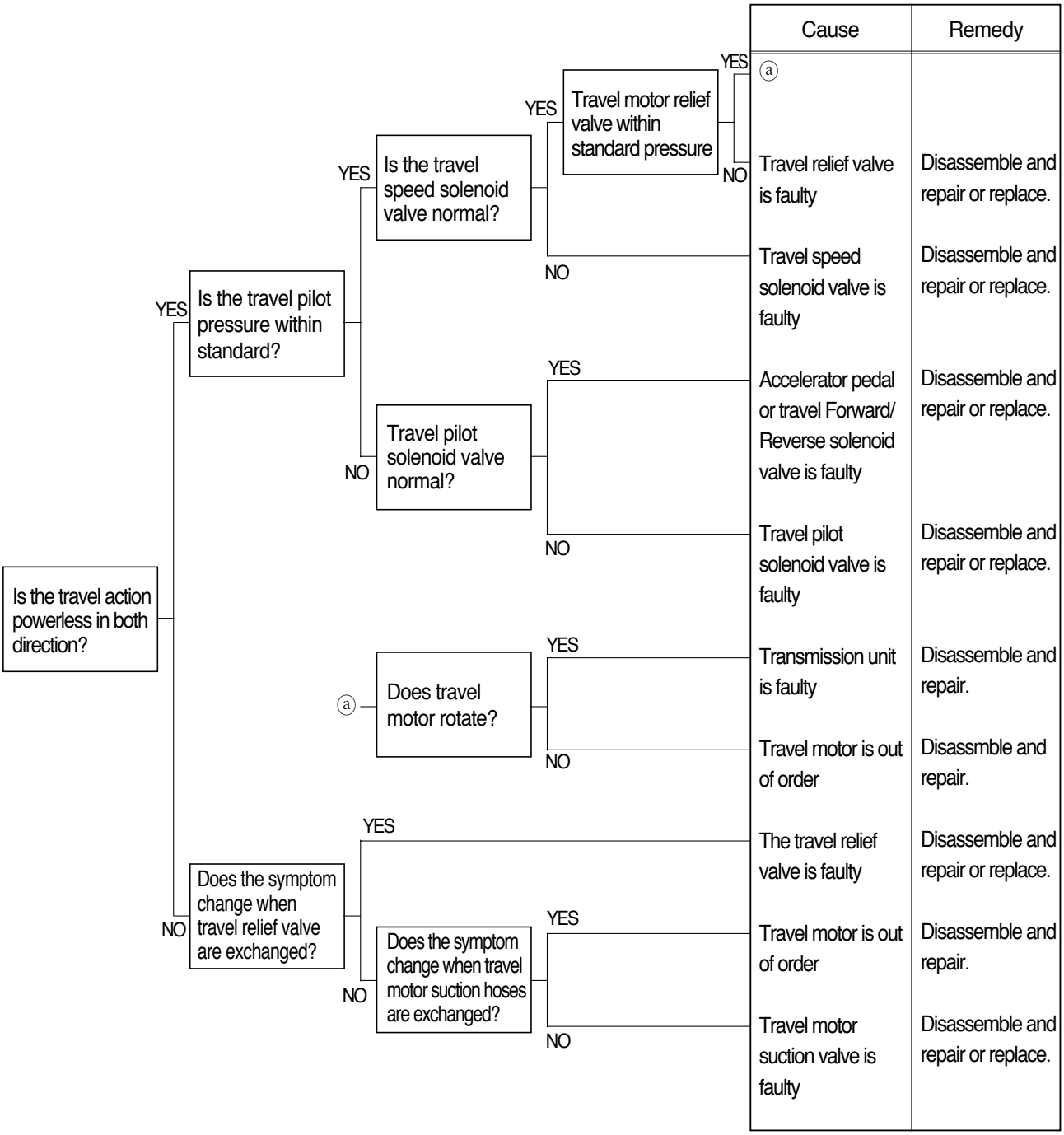
Cause	Remedy
ⓐ	
Shuttle valve is faulty.	Disassemble and replace.
Brake spring is faulty.	Disassemble and replace.
Return spring of swing control valve is faulty.	Disassemble and replace.
Swing relief valve is faulty.	Disassemble and repair or replace.
Swing motor is broken.	Disassemble and repair.
	Adjust swing relief valve pressure or replace swing relief valve.

5. TRAVEL SYSTEM

1) TRAVEL DOES NOT FUNCTION AT ALL ON ONE SIDE



2) TRAVEL ACTION IS POWERLESS(Travel only)



3) THE HYDRAULIC MOTOR DOSE NOT GET STARTED

	Cause	Remedy
The hydraulic motor does not get started	The spool does work properly. (The spool keeps fully open)	Screw the fitting bolts one more time with correct tightening torque. If the spool turns out to be damaged, it should be repaired or the new one should be used
	The anti-cavitation check valve does not work properly. (The check valve is kept open.)	Ditto

4) IT TAKES TIME TO ACCELERATE THE MOTOR

	Cause	Remedy
It takes time to accelerate the motor	The spool does not work properly.	Screw the fitting bolts one more time with correct tightening torque. If the spool turns out to be damaged, it should be repaired, or the new one should be used.
	The orifice for closing the counterbalance is clogged.	Remove the foreign matter by disassembling and cleaning.
	Wrong setting of pressure of the relief valve.	Adjust at the correct value. If the relief valve turns out to be out of order, the new one should be used.

5) IT IS NOT POSSIBLE TO REDUCE THE MOTOR SMOOTHLY

It is not possible to reduce the motor smoothly

Cause	Remedy
The orifice for closing the counterbalance is clogged. The opening of the neutral position of the spool is clogged.	Remove the foreign matter by disassembling and cleaning.
Wrong setting of pressure of the relief valve.	Adjust at the correct value. If the relief valve turns out to be out of order, the new one should be used.

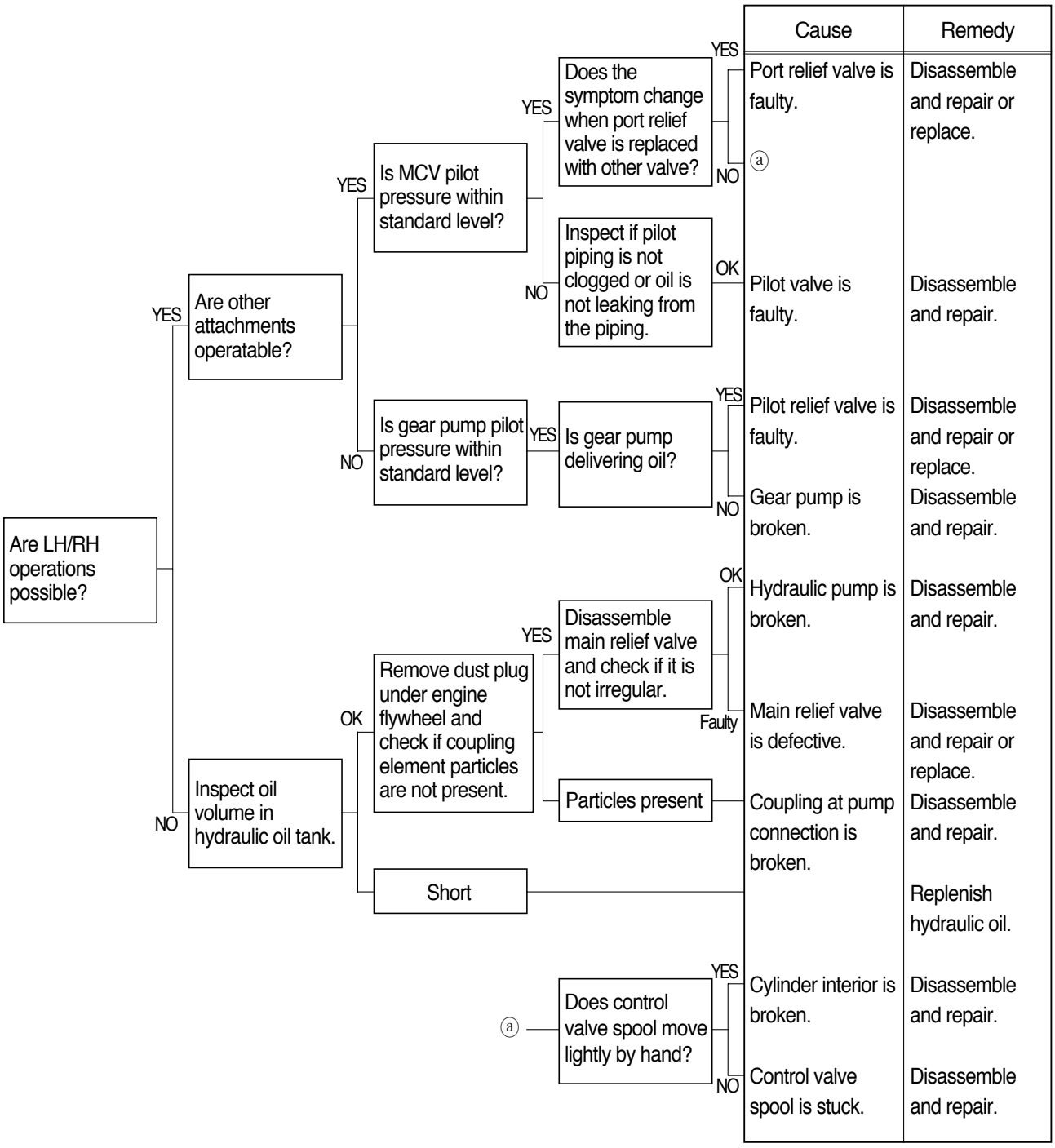
6) EXTRAORDINARY NOISE IS HEARD WHEN SUDDENLY REDUCING THE SPEED FROM THE HIGH-SPEED MODE

It takes time to accelerate the motor

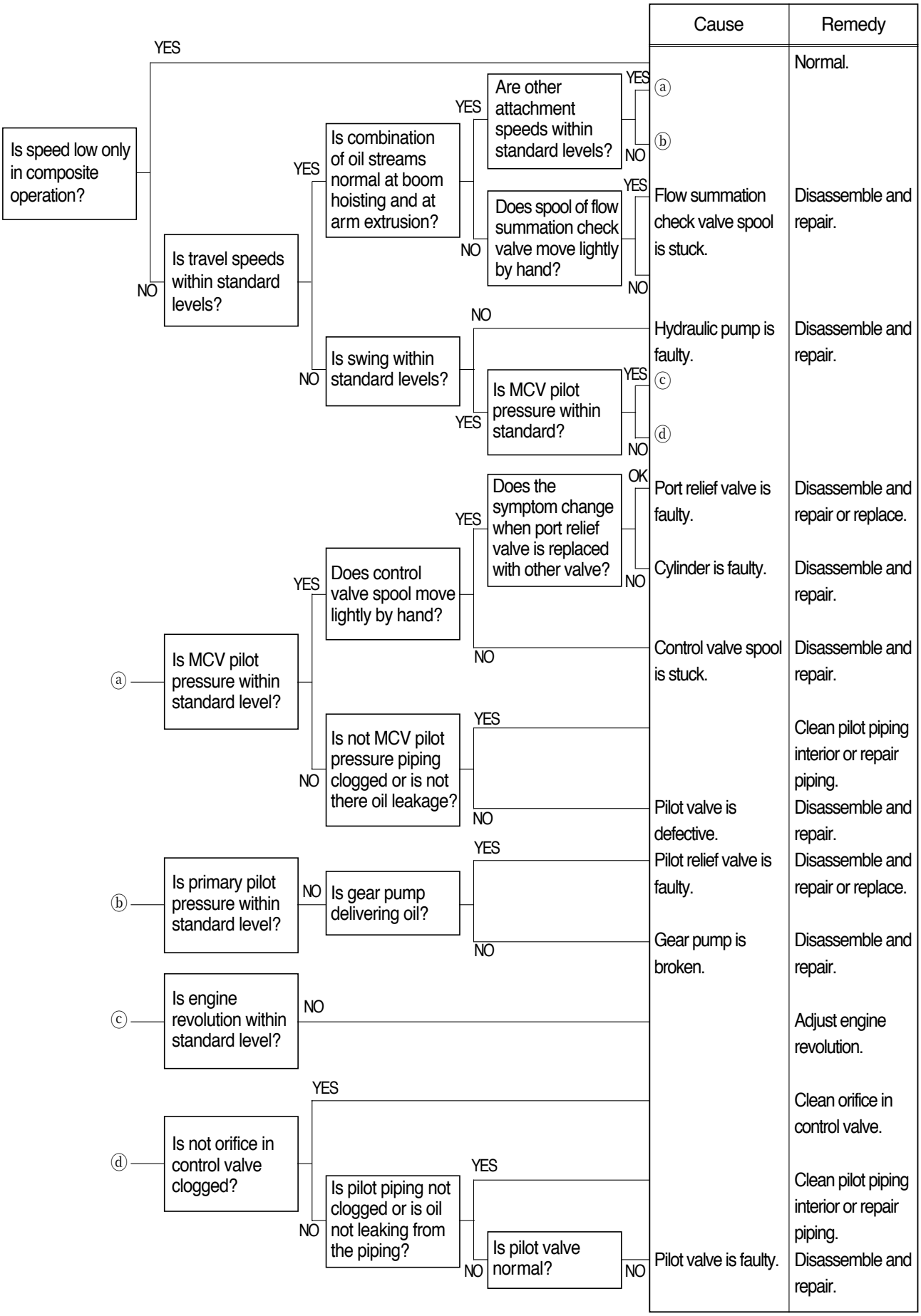
Cause	Remedy
The anti-cavitation valve does not not work properly.	Screw the fitting bolts one more time with correct tightening torque. If the valve turns out to be damaged, is should be repaired.

6. ATTACHMENT SYSTEM

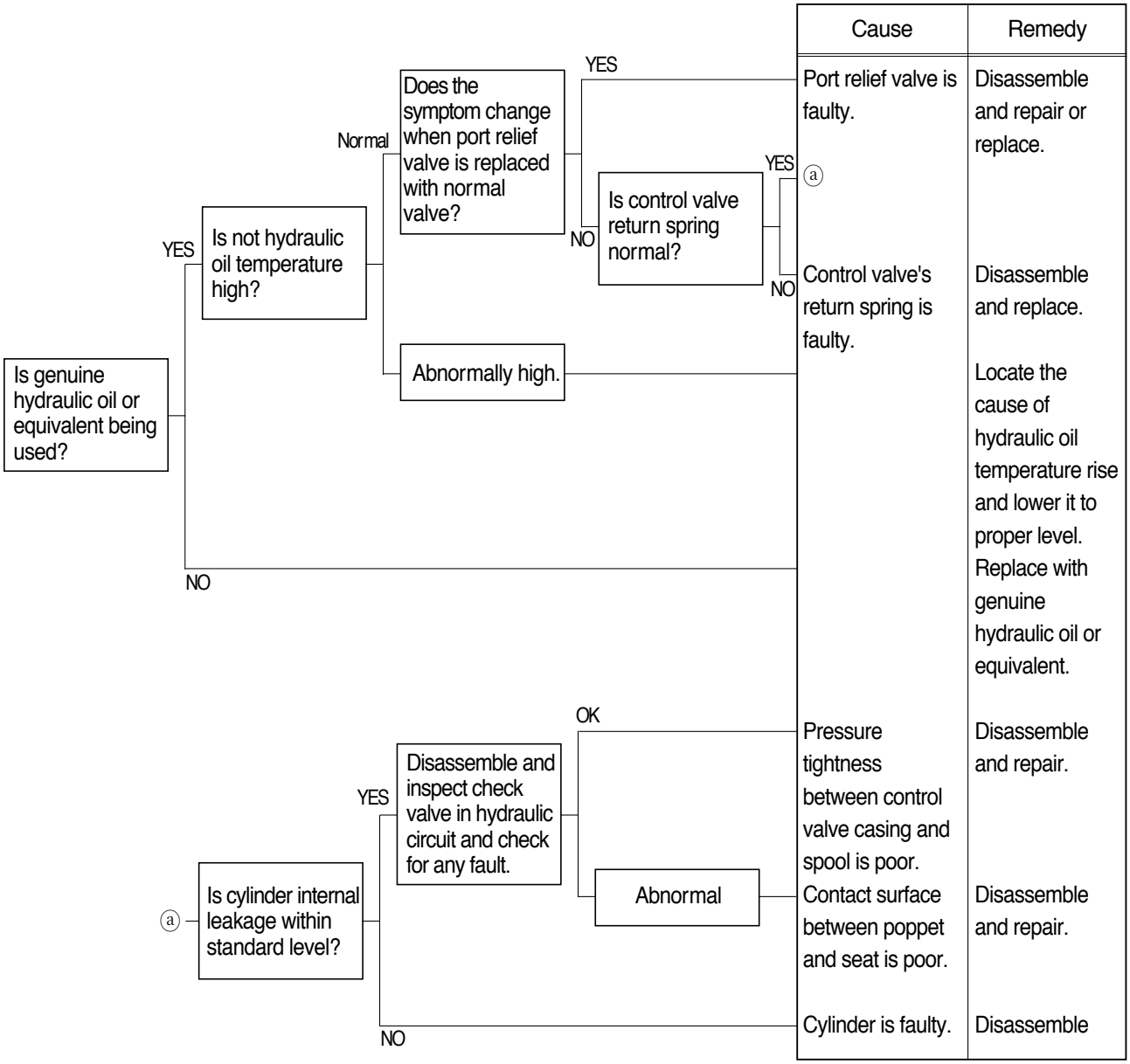
1) BOOM OR ARM ACTION IS IMPOSSIBLE AT ALL



2) BOOM, ARM OR BUCKET SPEED IS LOW

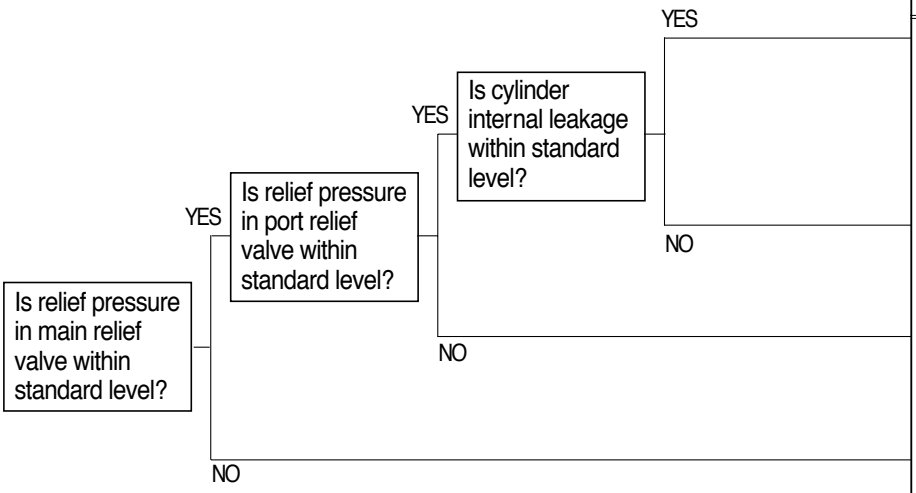


3) BOOM, ARM OR BUCKET CYLINDER EXTENDS OR CONTRACTS ITSELF AND ATTACHMENT FALLS



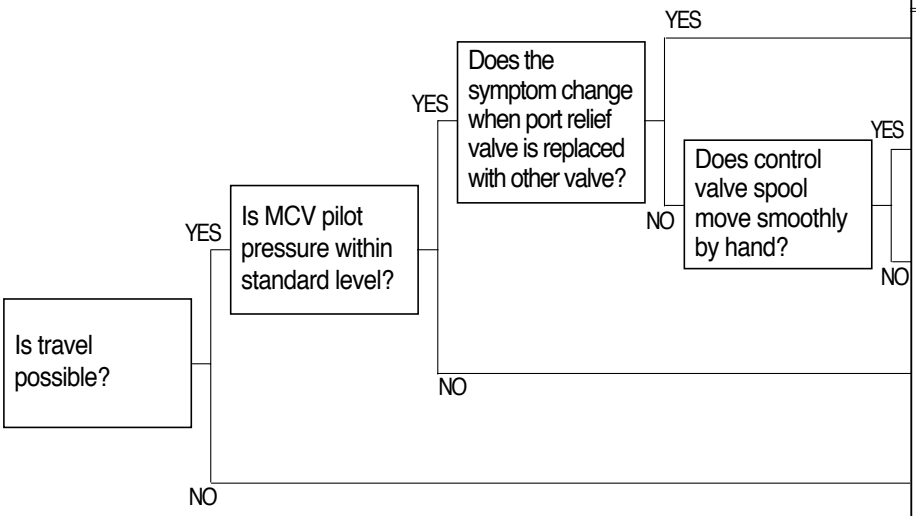
Cause	Remedy
Port relief valve is faulty.	Disassemble and repair or replace.
ⓐ	
Control valve's return spring is faulty.	Disassemble and replace.
	Locate the cause of hydraulic oil temperature rise and lower it to proper level. Replace with genuine hydraulic oil or equivalent.
Pressure tightness between control valve casing and spool is poor.	Disassemble and repair.
Contact surface between poppet and seat is poor.	Disassemble and repair.
Cylinder is faulty.	Disassemble

4) BOOM, ARM OR BUCKET POWER IS WEAK



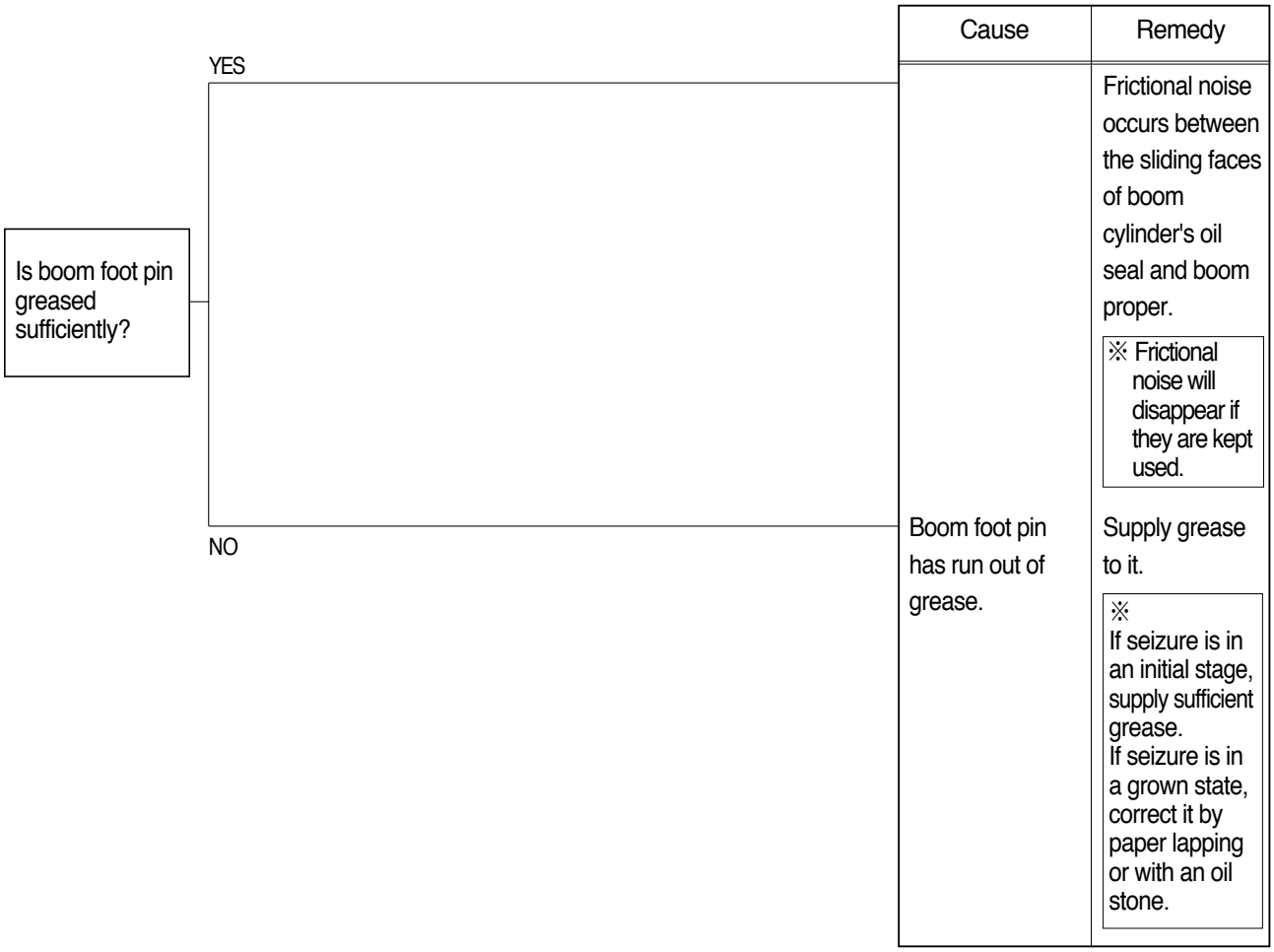
Cause	Remedy
	Check according to the procedure in Item "Speed is low".
Cylinder is faulty.	Disassemble and repair.
Port relief valve is faulty.	Adjust pressure, repair or replace.
Main relief valve is defective.	Adjust pressure, repair or replace.

5) ONLY BUCKET OPERATION IS TOTALLY IMPOSSIBLE



Cause	Remedy
Port relief valve is defective.	Disassemble and repair or replace.
Cylinder interior is broken.	Disassemble and repair.
Control valve spool is stuck.	Disassemble and repair.
Pilot valve is faulty.	Disassemble and repair.
Hydraulic pump is broken.	Disassemble and repair.

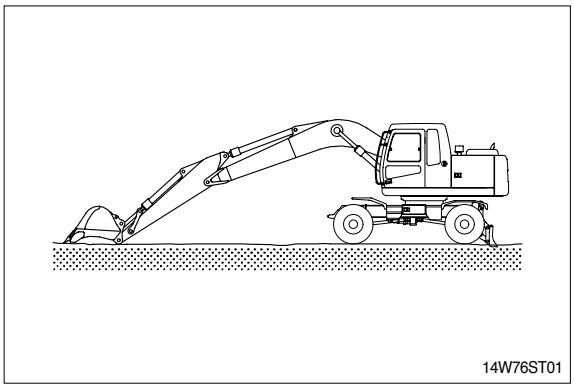
6) BOOM MAKES A SQUEAKING NOISE WHEN BOOM IS OPERATED



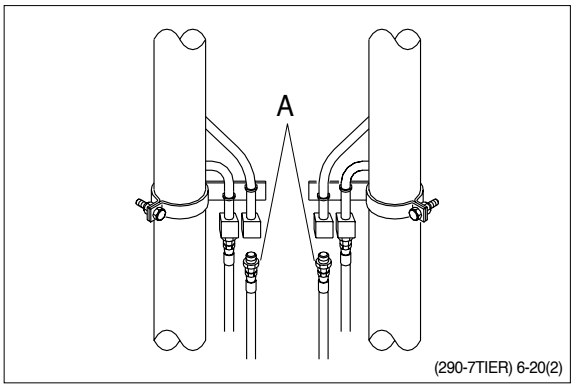
Cause	Remedy
	Frictional noise occurs between the sliding faces of boom cylinder's oil seal and boom proper. ※ Frictional noise will disappear if they are kept used.
Boom foot pin has run out of grease.	Supply grease to it. ※ If seizure is in an initial stage, supply sufficient grease. If seizure is in a grown state, correct it by paper lapping or with an oil stone.

※ HOW TO CHECK INTERNAL BOOM CYLINDER LEAKAGE

1. Lower the bucket teeth to the ground with bucket cylinder fully retracted and arm cylinder rod retracted almost in full.

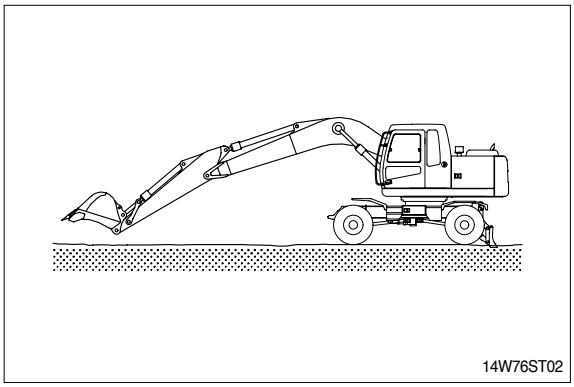


2. Disconnect hose(A) from rod side of boom cylinder and drain oil from cylinders and hose.(Put cups on piping and hose ends)



3. Raise bucket OFF the ground by retracting the arm cylinder rod.

   If oil leaks from piping side and boom cylinder rod is retracted there is an internal leak in the cylinder.
   If no oil leaks from piping side and boom cylinder rod is retracted, there is an internal leak in the control valve.



7. FRONT AXLE AND REAR AXLE

Problem	Cause	Correction
Insufficient braking	1. Incorrect adjustment	Inspect disc thickness and if discs are usable readjust brakes to the specifications in the manual.
	2. Brake discs worn out	Inspect disc thickness and replace if necessary.
	3. Incorrect brake fluid	Replace all seals in axle and master cylinder that have made contact with the incorrect fluid and all brake hoses. If incorrect fluid leaked into axle oil, seals and O-rings in axle must be replaced.
	4. Loss of brake fluid	Inspect for and repair any leaks in outside circuit or master cylinder. If caused by incorrect brake fluid see correction No.3. If leak is to the outside replace the O-rings between the center and intermediate housings. If leak is to the inside replace above O-rings and brake piston O-rings.
	5. Overheated axle causing brake fluid to vaporize. (Brake return when axle cools)	See “overheating” problem.
Soft brake pedal	6. Air in brake circuit	Bleed air in brake circuit.
Ineffective safety brake	7. Incorrect adjustment	See correction No.1.
	8. Brake disc worn out	See correction No.2.
Overheating	9. Oil level wrong	Drain, flush and refill oil to proper level.
	10. Too small of a brake gap	Readjust brakes to the specifications.
	11. Park brake dragging	Unlock the brake and adjust the correct gap.
	12. Incorrect brake fluid in system	See correction No.3.
	13. No free-pedal at master cylinder	Readjust brake pedal.
	14. Restriction in brake lines	Inspect for and replace damage lines.
	15. Restriction in return line of brake servo system	Inspect for and replace damaged return line. Inspect for and remove any filter, tee’d in line or any other source of back pressure from the return line.
	16. Incorrect lubricant	Change the retaining rings of the brake circuit and brake pump.
Diff-lock inoperative	17. If manual control, loose or misadjusted linkage	Inspect and correct linkage and readjust.
	18. If hydraulic control, problems in the hydraulic or electrical circuits of the machine.	Refer to the hydraulic or electrical section in this manual.
	19. If hydraulic control problems in actuating cylinder(noteable through loss of hydraulic oil or increase of the oil level in axle)	Rebuilt cylinder.
	20. If with limit slip differential, worn discs	Replace discs.

Problem	Cause	Correction
Oil coming out of breather	21. Leak in internal brake system	See correction No.2 and No.3.
	22. Leak in diff-lock actuating cylinder	See correction No.19.
Nospin indexing noise when driving straight ※With nospin, fatigue damage can occur on the side with the larger tire.	23. Unequal tire pressure left and right	Inflate tires to the recommended pressure in this manual, or until the rolling radius is equal.
	24. Different style, size or brand of tires between left and right hand side	Change tires to make the rolling redius equal. Vary the tire pressure within the specifications until the rolling radius is equal.
Noise during coast and under power the same	25. Wheel bearings damaged	Replace and adjust
Noise under power greater than during coast	26. Low oil level	Refill oil to preper level
	27. Incorrect lubricant	See correction No.16.
	28. Ring and pinion worn	Inspect through top cover. Replace and adjust.
	29. Worn ring and pinion bearings	Replace and adjust
	30. Worn planetary gears or bearings	Replace.
Noise during coast greater than under power	31. Loose pinion nut	Inspect ring, pinion and pinion bearings. If undamaged, retighten nut.
	32. Only pinion bearing damaged	See correction No.29.
Noise during turn (Without nospin)	33. Worn spider and/or side gears	Replace.
A stick slip noise when going from forward to reverse	34. Worn or damaged cardan shaft	Inspect and replace.
	35. Loose wheel	Inspect for wheel and wheel stud damage. Replace if needed and retorque lugnuts.
	36. Articulation box joint and achsel shaft damaged	Inspect and replace.
	37. Spider pins loose in diff-carrier	Inspect through top cover. Replace.
	38. Damaged or missing spider and/or side gear washers	See correction No.33.